SCIENCE RESPONSE TO INFORMATION REQUESTS SUBMITTED TO THE ENBRIDGE PIPELINE PROJECT ENVIRONMENTAL IMPACT ASSESSMENT HEARINGS RESPECTING MARINE MAMMALS

Context

Fisheries and Oceans Canada's (DFO) Environmental Assessment and Major Projects Division (EAMP), Pacific Region, requested that DFO Science, Pacific Region, on May 15, 2012, provide information regarding specific Information Requests (IRs) submitted to the Enbridge Review Panel that DFO Science has the expertise to evaluate. As the IRs for which Science advice was requested cover a range of issues and scientific disciplines, separate Science Responses have been developed for each category of IRs, and in some cases specific IRs. In addition to science related questions, some IRs included elements that were questions pertaining to DFO policy, management or legal information. This Science Response addresses the scientific elements of the following questions:

- Please explain whether or not, and why, DFO is satisfied that Enbridge Northern Gateway Project's (NGP's) response to its IR 2.22 that NGP provide a new assessment of risk to sea lions since DFO considered the assessment provided by NGP to be "based on outdated information?" If DFO is not satisfied with NGP's response, please explain why it has not filed a Notice of Motion with the Joint Review Panel (JRP) to compel NGP to provide the necessary information?
- How is information on sea lions relevant to the assessment of potential risks associated with the Project? [NGP Response to Federal Government IR No.2, number 2.22; Volume 2, Part I, section 601].
- Is DFO satisfied with the Proponent's response to IR No.2, section 2.30 regarding the duration of environmental effects from a spill? Please provide a rationale for the answer. [NGP Response to Federal Government IR No.2, number 2.30; Volume 2, Part 1, section 1211].

This Science Response report is from the Fisheries and Oceans Canada, Canadian Science Advisory Secretariat, Regional Science Special Response Process (SSRP) of May 29th, 2012 on the Science advice in response to information requests submitted by Intervenors to the Enbridge Northern Gateway pipeline project environmental assessment Panel Review Process. Additional publications from this process will be posted as they become available on the Fisheries and Oceans Canada Science Advisory Schedule at www.dfo-mpo.gc.ca/csas-sccs/index-eng.htm.

Background

The Enbridge Northern Gateway Project proposes to ship dilute bitumen from Kitimat, British Columbia to markets in China and California with tankers of the class Very Large Crude Carriers (VLCC) (Vol. 1, B1-2, Enbridge Northern Gateway Project Section 52 Application). The tanker

route from Kitimat through confined waterways in British Columbia and then into open waters of Hecate Strait, Dixon Entrance and Queen Charlotte Sound in British Columbia are illustrated in Figure 1. For assessment purposes Enbridge Northern Gateway defines two areas, the Confined Channel Assessment Area (CCAA) (Figure 2) and the Open Water Assessment Area (OWAA) which is BC waters to the territorial sea limit (Figure 1). Incoming ships will deliver cargoes of condensate. Enbridge Northern Gateway estimate 71 condensate and 149 oil tankers call in at the Kitimat terminal for a total of 440 transits per year (Vol. 8C, B3-37, Enbridge Northern Gateway Project Section 52 Application). A marine terminal will be constructed near Kitimat with two tanker berths and one utility berth (Vol. 1, B1-2, Enbridge Northern Gateway Project Section 52 Application). The Project Effected Assessment Area (PEAA) that will be associated with the terminal construction is illustrated in Figure 3.

There were two IR submissions made to the Joint Review Panel (JRP) by DFO. Enbridge Northern Gateway provided responses to requests for information in the IRs. Since then Intervenor review of the Environmental Assessment documents prepared by the proponent (Enbridge Northern Gateway) and of the IRs and the responses by the proponent has resulted in a series of further questions to DFO by Intervenors.

DFO Science leads research on Sea Otters, which are listed under the Species at Risk Act as *Special Concern*, to assess population growth, population size and range of occupation. The Sea Otter population is now established along much of the west and north coast of Vancouver Island, along portions of the central BC coast and is also now established off the west coast of Aristazabal Island immediately adjacent to the CCAA (Nichol et al. 2009). It is anticipated the Sea Otter population will become established in portions of the CCAA and other northern coastal areas as the species recovers to its historic distribution The abundance and distribution of Steller Sea Lions also listed as *Special Concern* is determined using aerial survey techniques. There are Steller Sea Lion winter haul outs in the CCAA and the OWAA and all rookery sites in Canadian Pacific waters occur in the OWAA (Olesiuk 2008, Olesiuk, P.F. Recent trends in the abundance of Steller Sea Lions (*Eumetopias jubatus*) in British Columbia. NMMRC Working Paper No. 2001-10, Olesiuk, P.F. Abundance of Steller Sea Lions (*Eumetopias jubatus*) in British Columbia. NMMRC Working Paper No 2010-10a).

Figure 1. Map illustrating the proposed tanker routes through the Confined Channel and Open Water Assessment Areas (CCAA and OWAA). The OWAA extends to the territorial sea boundary (from Volume B9-42 Enbridge Northern Gateway Project).

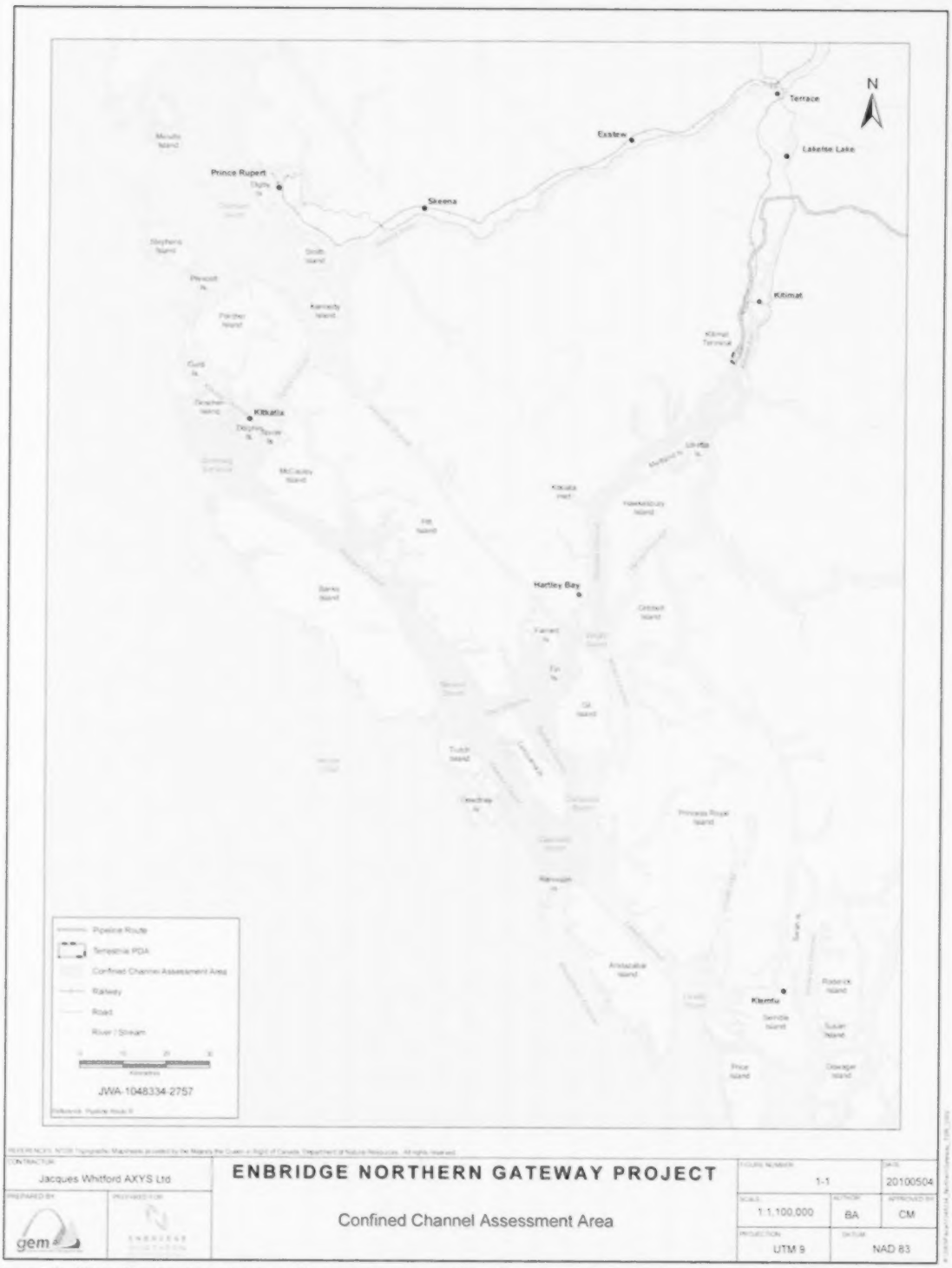

Figure 2. Map illustrating the location and extent of the Confined Channel Assessment Area (CCAA) (from Volume 8B Enbridge Northern Gateway Project Section 52 Application).

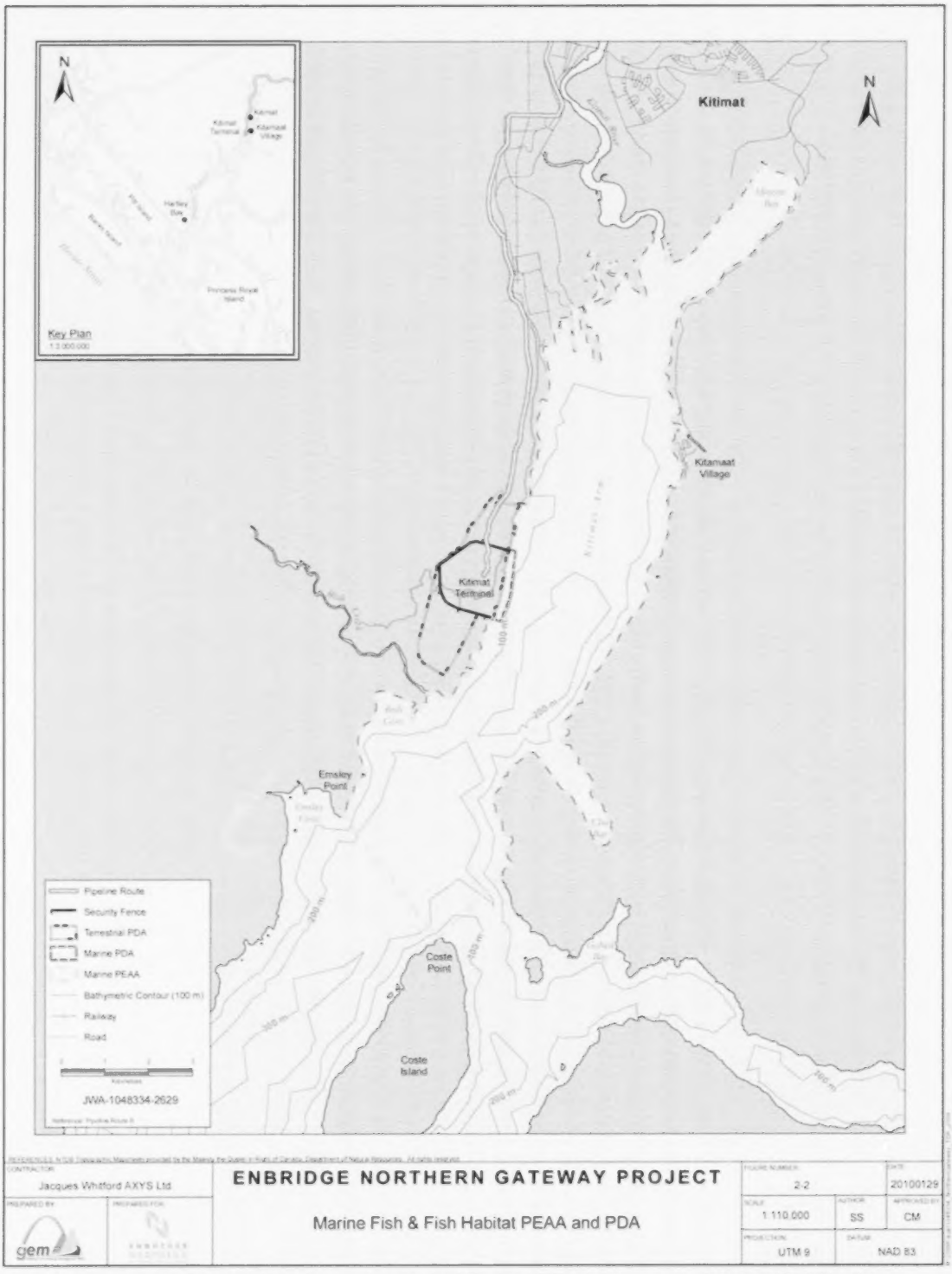

Figure 3. Map illustrating the location and extent of Project Effect Assessment Area (PEAA). (from Enbridge Northern Gateway Project Technical Data Report, Marine Fish and Fish Habitat 2010).

Analysis and Responses

The proponent's response in IR 2.22 appears to only consider Steller Sea Lions within the PEAA. While there are no known sea lion haulouts or rookeries within the PEAA, there are a large number of important sites in the CCAA and OWAA. Steller Sea Lions have been listed under SARA as a species of *Special Concern*, defined by COSEWIC as a species sensitive to human activities or natural events. Steller Sea Lions are especially vulnerable when they come ashore in large numbers at traditional haulout sites and rookeries, which are recognized as ecologically and biologically significant areas. The proponent indicated there are 4 breeding areas and 23 year-round haulouts in British Columbia, but the information is outdated and there are currently 5 breeding areas and 27 year-round haulouts. There are also numerous winter haulout sites used by foraging animals, including lactating females from breeding sites in B.C. and neighbouring waters that should be considered. The winter sites are not as traditional and year-round haulout sites and rookeries, and wintering areas tend to shift with prey availability. There are a total of about 45 Steller Sea Lion sites, including all 5 of the breeding areas within Canadian waters, within the CCAA or OWAA. Comprehensive or complete information on distribution of Steller Sea Lions should be taken from the following Steller Sea Lions scientific assessments and data reports (Bigg 1984, 1985; DFO 2003; Olesiuk 2008, Olesiuk, P.F. Recent trends in the abundance of Steller Sea Lions (*Eumetopias jubatus*) in British Columbia. NMMRC Working Paper No. 2001-10, Olesiuk, P.F. Abundance of Steller Sea Lions (*Eumetopias jubatus*) in British Columbia. NMMRC Working Paper No 2010-10a) and the most recent unpublished surveys information can be obtained from DFO Science.

The proponent stated that environmental effects (of petroleum spills) to Sea Otters, harbour porpoise and other marine mammals will not last more than 5 to 10 years (Volume 8C B3-42 Section 11.2.4.1. Enbridge Northern Gateway Project Section 52 Application). In IR 2.30, DFO requested a rationale for this statement.

Scientific publications based on long term studies of Killer Whales and Sea Otters in Prince William Sound, Alaska, site of the Exxon Valdez Oil Spill (EVOS) in 1989 demonstrate effects can persist for decades at least in these two species. Contact with petroleum has immediate effects on Sea Otters which depend on the integrity of their fur for insulation. Animals may die from hypothermia as a result of lost insulation and/or from subsequent organ damage resulting from ingestion of petroleum when grooming oiled pelage (Lipscomb et al. 1993). Mortality estimates immediately following EVOS ranged from 2,650 (Garrott et al. 1993) to 3,905 Sea Otters (DeGange et al. 1994). Long term effects appear to have persisted because Sea Otters feed on benthic invertebrates which can accumulate and store toxic hydrocarbons during, and after, a petroleum spill and because Sea Otters will excavate for prey in intertidal and subtidal sediment. Population modeling using data from 1976 to 1998 showed that Sea Otters in Prince William Sound had decreased survival rates in all age-classes in the nine years following the spill (Monson et al. 2000). On-going research provides additional evidence that Sea Otters in Prince William Sound are subjected to chronic oil exposure from residual oil in local sediments with population growth and health effects and suggests residual oil can affect wildlife populations on time scales much longer than previously believed and that cumulative chronic effects can be as significant as acute effects (Bodkin et al. 2002, Ballachey et al. 2003, Peterson et al. 2003, Monson et al. 2011, Bodkin et al. 2012).

Using five years of annual population census data prior to EVOS and annual census data since 1989, mortality of Killer Whales and lack of recovery two decades later in two ecologically and genetically separate groups of Killer Whales (AB and AT1) that occur in Prince William Sound has been documented (Matkin et al. 2008). AB pod and the AT1 transient population lost 33% and 41% of their members in the year following EVOS. AB pod and members of AT1 were

observed swimming through heavy sheens of oil during the EVOS but the authors also discuss the likelihood of on-going exposure to contaminants for the AT1 animals through consumption of petroleum contaminated prey (pinnipeds). AB pod growth rate remains significantly below that of other resident eco-type Killer Whales in the region. AT1 continues to decline and the loss of reproductive-age females is a major demographic factor (Matkin et al. 2008). The AT1 population is now listed as *Depleted* under the U.S. Marine Mammal Protection Act.

Conclusions

Without detailed and updated information on Steller Sea Lion distribution DFO Science is not able to assess potential impacts to the species.

Scientific studies of Sea Otter and Killer Whales in Prince William Sound Alaska indicates that the effects from the Exxon Valdes Oil Spill have persisted for two decades in these two marine mammal species.

Contributors

Name	Affiliation
Linda Nichol	DFO Science, Pacific Region
Peter Olesiuk	DFO Science, Pacific Region
John Ford	DFO Science, Pacific Region
Graeme Ellis	DFO Science, Pacific Region
Marilyn Joyce (Editor)	DFO Science, Pacific Region

Approved by

Laura Brown
Manager, Marine Ecosystem and Aquaculture Division
DFO Science, Pacific Region
Nanaimo, BC

Sources of information

Ballachey, B.E., Bodkin, J.L., Howlin, S., Doroff, A.M., and Rebar, A.H. 2003. Correlates to survival of juvenile Sea Otters in Prince William Sound, Alaska, 1992–1993. Can. J. Zool. 81:1494-1510.

Bigg, M.A. 1985. Status of the Steller Sea Lion (*Eumetopias jubatus*) and California Sea Lion (*Zalophus californianus*) in British Columbia. Can. Spec. Publ. Fish. Aquat. Sci. No. 77. 20pp.

Bigg, M.A. 1984. Sighting and kill data of Steller Sea Lions (*Eumetopia jubatus*) and California Sea Lions (*Zalophus californianus*) from British Columbia during 1892-1982, with some records from Washington and southeastern Alaska. Can. Tech. Rep. Fish. Aquat. Sci. No. 460.

Bodkin, J.L., Ballachey, B.E., Coletti, H.A., Esslinger, G.G., Kloecker, K.A., Rice, S.D., Reed, J.A. and Monson, D.H. 2012. Long-term effects of the 'Exxon Valdez' oil spill: Sea Otter foraging in the intertidal as a pathway of exposure to lingering oil. Marine Ecology Progress Series 447:273-287.

Bodkin, J.L., Ballachey, B.E., Dean, T.A., Fukuyama, A.K., Jewett, S.C., McDonald, L., Monson, D.H., O'Clair, C.E. and VanBlaricom, G.R. 2002. Sea Otter population status and the process of recovery from the 1989 'Exon Valdez' oil spill. Marine Ecology Progress Series 241:237-253.

DeGange, A.R., Doroff, A.M. and Monson, D.H. 1994. Experimental recovery of carcasses at Kodiak Island, Alaska, following the Exxon Valdez oil spill. Marine Mammal Science 10:492-496

DFO. 2003. Steller Sea Lion (*Eumetopias jubatus*). DFO Can. Sci. Advis. Sec. Stock Status Rep. 2003/037.

Enbridge Northern Gateway Project Joint Review Panel 2012. https://www.neb-one.gc.ca/ll-eng/livelink.exe/fetch/2000/90464/90552/384192/620327/customview.html?func=ll&objId=620327&objAction=browse&sort=-name. Accessed May 22, 2012

Garrott, R.A., Eberhard, L.L., and Burns, D.M. 1993. Mortality of Sea Otters in Prince William Sound following the Exxon Valdez oil spill. Marine Mammal Science 9:343-359.

Lipscomb, T.P., Harris, R.K., Moeller, R.B., Pletcher, J.M., Haebler, R.J. and Ballachey, B.E. 1993. Histopathologic lesions in Sea Otters exposed to crude oil. Veterinary Pathology 30:1-11.

Matkin, C.O., Saulitis, E.L., Ellis, G.M., Olesiuk, P. Ongoing Population-level Impacts on Killer Whales *Orcinus orca* Following the Exxon Valdez Oil Spill in Prince William Sound, Alaska. *Marine Ecology Progress Series* 356: 269–281.

Monson, D.H., Doak, D.F., Ballachey, B.E. and Bodkin, J.L. 2011. Could residual oil from the Exxon Valdez spill create a long-term population "sink" for Sea Otters in Alaska? Ecological Applications 21(8):2917-2932.

Monson D.H., Doak, D.F., Ballachey, B.E., Johnson, A. and Bodkin, J.L. 2000. Long-term impacts of the Exxon Valdez oil spill on Sea Otters, assessed through age-dependent mortality patterns. Proceedings of the National Academy of Science. 97(12): 6562-6567.

Nichol, L.M., Boogaards, M.D., Abernethy, R. 2009. Recent trends in the abundance and distribution of Sea Otters (*Enhydra lutris*) in British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc. 2009/016. iv + 16 p.

Olesiuk, P.F. 2008. Abundance of Steller Sea Lions (*Eumetopias jubatus*) in British Columbia. DFO Can. Sci. Advis. Sec. Res. Doc. 2008/63.

Peterson, C.H., Rice, S.D., Short, J.W., Esler, D., Bodkin, J.L., Ballachey, B.E., Irons, D.B. 2003. Long-term ecosystem response to the Exxon Valdez oil spill. Science 302(5653):2082-2086.

This Report is Available from the

Centre for Science Advice - Pacific Region
Fisheries and Oceans Canada
3190 Hammond Bay Road
Nanaimo, British Columbia
Canada, V9T 6N7

Telephone: 250-756-7208
E-Mail: CSAP@dfo-mpo.gc.ca
Internet address: www.dfo-mpo.gc.ca/csas-sccs/

ISSN 1919-3750 (Print)
ISSN 1919-3769 (Online)
© Her Majesty the Queen in Right of Canada, 2013

La version française est disponible à l'adresse ci-dessus.

Correct Citation for this Publication:

DFO. 2013. Science response to information requests submitted to the Enbridge pipeline project environmental impact assessment hearings respecting marine mammals. DFO Can. Sci. Advis. Sec. Sci. Resp. 2012/027.